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1986 PRODUCTS AND SERVICES(U) ARMY TRADOC ANALYSIS
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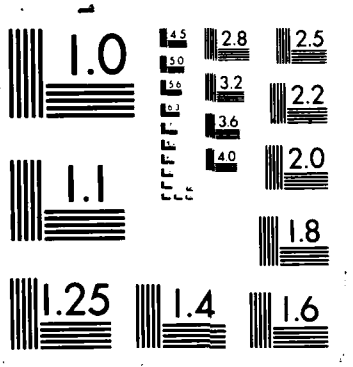
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UNITED STATES ARMY
TRADOC ANALYSIS COMMAND

TRAC-FLVN 1986 PRODUCTS AND SERVICES

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REPLY TO
ATTENTION OF

ATRC-F

15 April 1987

SUBJECT: TRAC-FLVN Products and Services

1. This document is published semiannually and contains abstracts of products/services completed within the U.S. Army TRADOC Analysis Command at Fort Leavenworth during the six-month period ending 31 December 1986. The TRADOC Analysis Command at Fort Leavenworth (TRAC-FLVN) is one of the major analytic activities of TRAC.

2. The mission of TRAC-FLVN is threefold:

a. To study, analyze, and make recommendations on doctrine, concepts, force design, command and control, and combined arms combat development issues from brigade through echelons above corps.

b. To develop scenarios for combat developments, simulations, and war games.

c. To develop and field a family of automated simulations for use in command and staff training exercises by field headquarters.

3. TRAC-FLVN Headquarters is located in Building 193, Fort Leavenworth, Kansas. Telephone numbers are: Commerical (913) 684-4510/2533, AUTOVON 552-4510/2533, and FTS 753-4510/2533. Comments or questions pertaining to the products and services contained herein may be addressed to the undersigned.

SAMUEL K. WASAFF, JR.
Colonel, Infantry
Acting Director, TRAC-FLVN

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1986 PRODUCTS

ARMY COMMAND AND CONTROL SYSTEM ANALYSIS INTEGRATION (ACCSAI) PROJECT

This project provided analytical and methodology support to CACDA C3I in the development of a management program by which ACCS studies, projects, tools, and test and exercise data collection may be integrated Army-wide. The management program, when approved, will be implemented by DA ODCSOPS as the program manager. The proposed program will be documented by changes to AR 11-39, The ACCS Program, and a draft DA Pam xx-xxx, the ACCSAI Program. The projected date for implementation of the management program is June 1987. The project was sponsored by the DUSA (OR).

AIRLAND BATTLE CONVENTIONAL DEFENSE EHHANCEMENTS/SYNERGY - COUNTERFORCE POTENTIALS MODEL ENHANCEMENTS (ABCDE/S CFP ENHANCEMENTS)

The Counterforce Potentials Model (CFP) was enhanced to play smart munitions for use in the AirLand Battle Conventional Defense Enhancements/Synergy Study (ABCDE/S). CFP was provided to the ODADCSOPS Force Planning and Analysis Office (FPAO) for use in screening the force design alternatives and tactics presented in the ABCDE/S study. A new smart munitions technology was developed that determines the effectiveness of smart munitions under operational conditions. This methodology is being incorporated into other Army models.

COMMAND INFORMATION DATABASE (CID)

The Command Information Database project was concluded in mid-May 1986 with the approval and printing of the CID User's Manual. The CID project documented the formal information flow, C2 tasks, specific information requirements, communications means, and general AOE organizational architecture. It was designed as an evaluation tool for C2 analysis.

SOVIET COMMAND CONTROL RESEARCH

This project, sponsored by CAC Threats, documents the collective understanding of Soviet methods of command and control used by the motorized rifle regiment. Data are presented on the regimental C2 architecture and on the decision-making processes and timelines. The regimental architecture was assessed with respect to capabilities, strengths, and vulnerabilities. The analytic effort has been completed and the final report is in draft form.

ZERO ZERO STUDY

The Zero Zero Study was a JCS-sponsored study supported with CORBAN gaming and analysis. The purpose of this two-month effort was to determine the conventional force capability required to provide adequate deterrence, given a reduction in ballistic missiles. The results of approximately 25 cases gamed with CORBAN were used by DA DCSOPS for presenting Army requirements to the JCS and other DOD officials.

FORCE DESIGN ANALYSIS METHODOLOGY (FDAM)

This study effort sponsored by CACDA-FDD was terminated due to the allocation of resources to higher priority efforts. The purpose of the project was to develop quick turnaround methodologies to analyze force design alternatives. Focus was on the five force analysis components of lethality/survivability, sustainability, deployability, C3I, and tactical mobility. The principle focus of work before the project was terminated included modifications of the Counterforce Potentials Model and research on tactical mobility. Resources were allocated to this effort from May until diversion of resources in August.

DIVISION CAVALRY STUDY

This effort was initiated at the request of the Armor School to support their analysis of optimum organizational structure and missions for the division cavalry squadron. Historical data from the Deep Attack and AirLand Battle Studies, together with CORBAN gaming support, were provided to allow evaluation of division and corps issues and to further augment JANUS gaming conducted by the Armor School. Results from this effort were briefed to the Army Chief of Staff.

INGRESS POST PROCESSOR

This project initially began in Feb 1986 as a concept to test the feasibility of post-processor development using the INGRES relational data base. The effort began with a parallel effort to develop a new post-processor for CORDIVEM with one team using INGRES and one team using FORTRAN. In June, critical post-processor reports were compared for speed, flexibility, and resource intensity. While equal in other aspects, the INGRES system proved to be significantly more flexible. The FORTRAN effort was consequently abandoned and the six-person INGRES team was augmented with six additional members. By the start of CORDIVEM gaming in August, the development team had completed 19 of 21 planned reports. The two remaining reports were completed in September. During September and October, the reports were refined. By the end of October, all team members except a documentation team were returned to other duties.

This developmental effort initiated a valuable tool that provides flexible processing of raw history file data and it is adaptable to other models and applications.

ARTIFICIAL INTELLIGENCE RESEARCH AND APPLICATION PROJECT (AIRAP)

The purpose of this project is to conduct basic research of an evolving set of AI technologies to assess their utility to support the full scope of TRAC-FLVN's mission. In the July-December interval, AIRAP project analysts received training in several different areas of AI. Training included courses in: Knowledge Acquisition and Representation, Expert Systems for Middle Managers, KEE, Knowledge Engineering and Expert Systems Building, and Intermediate LISP Programming. Concept testing and prototype development is ongoing.

COMMAND CONTROL ANALYSIS TOOLS AND METHODOLOGIES (CCATM)

The purpose of this CACDA C3I-sponsored study is to establish the analytical framework for the conduct of command control analysis within TRAC-FLVN, to identify the models/tools necessary to execute the selected methodologies, and to initiate a program for the development and/or acquisition of these tools. Phase One of the project is nearing completion. The analytical framework has been described, available tools have been researched, a tool requirements document has been written, and a program to develop the tool has been initiated. Phase Two, entitled ATCCS Architecture Development Analysis Model (ADAM), has begun.

COMBINED ARMS MISSION AREA ANALYSIS (CAMAA)

This TRADOC-sponsored study was designed to improve the MAA process by providing to MAA proponents a common corps/division-level contextual framework. The purpose of the study is to determine battlefield deficiencies from a combined arms perspective, estimate the magnitude of the deficiencies, determine within which functional areas(s) there appear to be large payoffs in resolving specific deficiencies, and provide MAA proponents specific crucial areas to examine in detail in their respective MAAs. The CAMAA is utilizing the Europe VI (Eur VI) scenario and the Vector-in-Commander (VIC) model. It will provide high-resolution static scenarios to the MAA proponents for conducting the proponent MAAs. CAMAA SAG I met 27 November 1985 and approved the CAMAA study plan.

During the past year, several significant events have impacted on the CAMAA study effort. Since its initiation, the scope of the study effort has been expanded. This has required significant revisions to the study methodology and approach. Timelines have been modified to support this change in scope. The

first major milestone was completion of the front-end analysis. This effort included a literature search to document previously identified corps deficiencies and provide a preliminary definition of critical corps tasks. The results of this work were used in packaging the study effort into six major sub-analysis areas: C3I, antiarmor, survivability, sustainability, rear area operations, and deep maneuver. The seventh area of joint operations was added later at the direction of senior TRADOC leadership. Completion of a threat analysis in each of the seven subanalysis areas and further definition of a corps critical task list supported the documentation of the preliminary list of corps combined arms deficiencies published at year's end.

The CAMAA study effort also provided the vehicle for VIC model development at Ft. Leavenworth. During the year, significant progress was made toward development of an operational model. Identification of model problems and development of solutions throughout the year continually improved TRAC-FLVN's VIC modeling capability. Culmination of this effort has been completion of the first five-day combat run in early December. Refinement of this five-day simulation to support the CAMAA analysis and concurrent development of the Europe VI standard scenario is currently in progress.

ARMY 21

This study is a TRADOC-sponsored project. Army 21 is a warfighting concept which is part of the Army's Concept Based Requirements System (CBRS) to focus future combat developments. It provides the framework for incorporating advanced technologies into innovative organizational designs to destroy and defeat perceived threats in low, mid, and high intensity combat environments. TRAC is performing the evaluation of the ARMY 21 concept to assess its validity and desirability. Front end analysis on this study began in Sep 86 and was completed by the end of the year. The AMC Deputy Commander was briefed in December on the study methodology and AMC/TRADOC interactions to that date. Two Colonel level Senior Officer Seminars were convened in October and December to confirm the direction and findings of the front end analysis. The Three-Star, Study Advisory Group met on 7 Jan 87 and directed continued work on the study and other supporting tasks. The study now enters a phase where validation of the concept and methodology in a more rigorous setting over a broader range of conditions will take place.

AMMUNITION PLANNING FACTORS SYSTEM (APFS) STUDY)

The Ammunition Planning Factor Study System, sponsored by TRADOC, is a system to develop consistent ammunition planning factors (APFS) for use by Army elements. The system was designed to stop the proliferation of uncoordinated rates at local agencies by providing users of TRADOC planning factors with an approved, common data base, updated at regular intervals. The foundation of the system is the use of weapon system expenditure data from TRADOC combat models to develop force design and operational planning factors. As new

ammunition planning factors are developed, they will be incorporated into the Logistics Center data base for storage and distribution. Thus, when implemented, the Ammunition Planning Factors System will provide a disciplined method for the ammunition logistics data base to be regularly updated as new weapons, munitions, tactics, and organizations are evaluated in TRADOC. The draft final Report was completed and distributed for staffing.

COMMAND AND STAFF DECISION AIDS

This study which is sponsored by C3I, CACDA, is designed to improve U.S. Army C2 effectiveness through research, analysis, and development of automated applications which support critical C2 functions. Over 50 key functions occuring within the G3 arena have been identified as having potential for such applications. As part of this project, a computerized movement planning program (MOVEPLAN 1.0) was developed as a decision aid to assist the G3 in serial/march unit control. This program was validated and provided to the "C2MUG" in May 1986. Since being made available to users through C2MUG, 78 requests for the MOVEPLAN software have been filled. An additional 38 copies of documentation have been distributed. Recently, the detailed design phase was completed of an enhanced version of MOVEPLAN.

AIRLAND BATTLE FORCE - 1995 (FORCE 95)

The purpose of this TRADOC-directed study is to develop a preferred combat organization for the Army for the late 1990s. The study will maximize new and advanced materiel systems capabilities, updated functional concepts, doctrine, procedures, and human resources. During Phase I, Front End Analysis (Jul 86-May 87), CACDA will develop organizational and operational requirements (O&OR) for global down to company-level forces. In Phase II, Development of Alternatives (Jun 87-Jun 88), proponents will refine the O&ORs and will develop Automated Unit Reference Sheet (AURS) level detail force designs. During Phase III, Analysis of Alternatives (Jul 88-Nov 89), TRAC will analyze division/corps level forces based on aggregated proponent-developed forces. In Phase IV, Report Process (Dec 89-Sep 90), CACDA will brief the study results up to Chief of Staff, Army-level, and publish the final report. Resource constraints coupled with the impacts from the two-year budget cycle, forced extension of the study timelines by one year. Workshops to identify issues and prepare O&ORs down through brigade level were completed.

CORPS BATTLE SYSTEM (JESS)

During the period of July-December 1986, TRAC-FLVN was involved in the development of JESS 1.0 as well as the enhancement specification for JESS 1.1. The JESS project team (four personnel) has been tasked with providing direct support for software, hardware, data base, model design, methodology, and enhancements to CATA for the fielding of CBS (JESS). We are and have been an

active participant in the JESS development working group meetings, proposing steering committee direction on future enhancements. Coordination and contract efforts have been completed for the delivery of video and digitized terrain for Europe, Central America, and Korea. Contractual efforts to secure personnel for data base development were initiated and an initial level of effort was secured through Department of Energy at Oak Ridge, TN. Follow-on contract should be awarded in the spring of 1987. The JESS hardware suite was installed at Fort Leavenworth and the JESS personnel obtained and became proficient in the operation of the JESS scenario. Database development work was begun for III Corps. However, changes in fielding priorities resulted in a shift of effort to XVIII and V Corps data bases. Also during the period JESS team personnel supported the REDCOM/JPL functional validation numbers 6, 7, 8 and REDCOM exercise Bold Venture 87 at Fort Lewis, WA.

DEEP BATTLE INTEGRATION TRAINING (DBIT) SYSTEM.

TRAC-FLVN Provided consultative (technical) service to CATA for the requirements development of the DBIT system. The training device requirement (TDR) stated a need for three modes: CPX driver, command and staff trainer (CST), and seminar trainer. Requirements for CPX driver were defined. TRAC-FLVN defined the requirements and designed the CST for CATA and also provided CATA with the initial requirement document for the seminar trainer. These documents were sent to PM TRADE, the materiel developer, with only minor modifications as the Army's requirement documents.

The chosen CPX driver for DBIT, JESS, did not provide intelligence play to the level required for deep operations training of corps staffs. TRAC-FLVN and the MITRE Corporation designed an intelligence module for JESS based on the tactical simulation (TACSIM). As the proposed fielding of DBIT is 2-3 years off, CATA desires to provide an interim capability to work with JESS. TRAC-FLVN personnel have maintained contact with USAICS, TCATA, PMJTF, and other interested organizations and continue to modify the original design almost monthly as new information is found in an attempt to get the capability to the corps ASAP. (A technical document is being drafted to document the effort in detail.)

The requirement for an interface between JESS and the Army Tactical Command and Control Systems (ATCCS), e.g., MCS, AFATDS, ASAS, FAADC2I, and CSSCS, is also specified in the TDR. This requires interfacing a developing C2 training simulation with emerging wartime C2 systems which are equally changing. TRAC-FLVN, with MITRE support, has designed a fairly low-risk method of providing the interface, with MCS as the first step. A similar effort was started for interfacing the Advanced Field Artillery Tactical Data System (AFATDS). The intelligence module based on TACSIM provides for the interface to the All Source Analysis System (ASAS) although the detailed design of the interface is not yet started.

Due to clearance problems, TRAC-FLVN personnel participated in two JESS functional validations and Bold Venture as the CATA representatives monitoring the TACSIM-JESS interface development and accreditation. TRAC-FLVN personnel remain as CATA's TACSIM experts.

COMBAT SERVICE SUPPORT MODEL DESIGN

TRAC-FLVN completed, documented, and distributed a detailed design for a combat service support (CSS) model. TRAC initiated the design effort in response to repeated requests from the US Army Logistics Center (Log Cen) to improve our ability to represent CSS within our force-on-force models. The design has been extensively coordinated with the Log Cen and its associated schools, and the design specifies CSS representations that Log Cen has agreed to as being appropriate for incorporation within a corps-level model. While plans called for incorporation of the CSS model within CORDIVEM, the design is not tied to that single implementation and Log Cen is using the same design document as the basis for implementation of a CSS functional area model.

COMMON METHODOLOGY FOR CHEMICAL REPRESENTATION

TRAC-FLVN began, in December, a project to establish a common methodology for the representation of combat in a chemical environment. The impetus for this project was provided by a Chemical System Program Review (SPR) at which a lack of chemical representation in command and control training and models used for C2 training was noted by the Vice Chief of Staff of the Army. TRAC's approach to this project will be to specify a base methodology for representing chemical effects and environments and then to specify how this methodology should be incorporated into specific models used in C2 training (e.g., JESS, CORBAN, ARTBASS, etc.). A later extension of the project will determine how the accepted methodology can be incorporated into other force-on-force models under TRAC's control, such as VIC, to ensure that we are using common methods for training and analysis models.

BRIGADE BATTALION BATTLE SIMULATION (BBS).

Commenced conversion of the Australian battalion training simulation (COMBAT-SIM) for use by US forces. BBS will operate on the Army's standard hardware and operating systems (VAX/VMS). The conversion is a contractual effort with Perceptronics Inc. The conversion project is planned for development in two phases: Phase 1. Conversion of COMBAT-SIM to MICRO-VAX II and to permit play by US forces, followed by documentation and government testing to obtain type-classification. Phase 2. Incorporation of specified

enhancements at battalion level, development of COMBAT-SIM for brigade play, improvement of input/output procedures, and provision of final documentation. A plan was developed in conjunction with CATA and AMC to field and support BBS. Fielding will take place in FY88.

SOUTHWEST ASIA I (SWA I) SCENARIO

SWA I is a standard low-resolution scenario set in Southwest Asia depicting a 92 Blue force against a 96 Red force. The Jiffy model was used to game 78 hours of combat from January-June 86. The operational scenario and dynamic gaming report will become a member of the TRADOC family of scenarios to support future combat development studies.

EUROPE VI (EUR VI) SCENARIO

EUR VI is a standard low-resolution scenario set in Central Europe during the 92-96 timeframe. It is being used in CAMAA. Final corrections were being made to the operational scenario and it was sent to the print plant in January 1987. The revised concept of operation for the extended gaming was approved by CGSC on 1 December and briefed to the center/school representatives. The scenario will be used in support of CAMAA.

CAMAA gaming has shifted from CORDIVEM to the VIC model. The initial five-day run has been completed. The EUR VI scenario will use these VIC-generated battle results plus additional days needed to accomplish the deep maneuver as the basis for publishing a low-resolution European scenario as part of the TRADOC family of scenarios. Target for publishing the EUR VI dynamic scenario is summer 1987.

EUROPE 6.5 (EUR 6.5) SCENARIO

EUR 6.5 is a set of non-standard, low-resolution scenarios set in Central Europe during the 92-96 timeframe being used for the Antiarmor Master Plan, All-Source Analysis, Armored Family of Vehicles, Joint Target Sets, Forward Area Air Defense, Joint Surveillance, and Target Attack Radar Studies and the Deep Fires COEA. A workshop was held at TRAC-WSMR in mid-Jan 1987 to review the first VIC runs. Changes will be made to tactical decision rules to ensure that the model results were reasonable. The operational scenario will be published following the VIC review.

EUROPE VII (EUR VII) SCENARIO

Europe VII will be a standard low-resolution scenario set in northern Germany. Two meetings have been held with HQ, TRADOC, CAC Threats, CGSC, SWG, and the Log Cen to develop the scenario guidance in early January 1987. A tabletop

Wargame was developed to provide the Theater/Army Group perspective for the scenario and run in February 1987. Workshops are scheduled in March and April 1987 to develop and write the corps and division OPLANs.

STATIC SCENARIOS (HRS)

Static scenarios are brigade scenarios which will be used as a common framework for high-resolution analysis in support of CAMAA and the proponent MAAs. They will be snapshots of six situations which occur during the gaming of SWA I and EUR VI (three situations each). Selected static scenario situations will be used as context for battalion-level high-resolution scenarios to be gamed later. The three SWA I static scenarios (Mech Bde Def, Mech Bde Atk, Lt Inf Def, less threat orders) drafts are complete. Gaming data has been collected for the three Europe VI static scenarios (Hvy Bde Atk, Mech Bde Def, Lt Inf Bde Def). Draft order for Hvy Bde Atk is complete. JANUS gaming of the Hvy Bde Atk will be conducted 2-6 February at WSMR to support IAAWS and AFV. The FY87 high-resolution scenario workplan was distributed on 30 December 1986.

VIC CHEMICAL

Incorporated into VIC was the chemical methodology. This included chemical effects associated with casualties and down-wind hazards, the protrayal of the impact of MOPP on unit effectiveness and decontamination of effected units.

VIC

The primary major project was running the VIC model for the Combined Arms Mission Area Analysis using the Europe VI scenario. This required providing support of the data base, revision and upgrade of software, learning and documenting the code, and preparing and conducting model briefings.

FIRST BATTLE: BATTALION THROUGH CORPS (AUTOMATED) (FB:B-C)

The FB: B-C development team in the Training Systems Office (TSO) of STSD, TRAC-FLVN, supported FB:B-C users and CATA in the following exercises:

a. TLX-86, Hawaii, June-July 1986.

b. ORBIT GAUCHO, Fort Carson, October 1986.

c. CABER DRAGON, Fort Bragg, NC, November 1986.

d. American, British, Canadian, and Australian Conference, Fort Ord, December 1986.

The development team developed and field tested electronic warfare and PSYOP modules. The team conducted a conversion of the BASIC code to PASCAL and transferred the model to CGSC computers. During the CGSC KOREX exercise, FB:B-C was used as the major support vehicle. The development team provided assistance, instruction, and on-site support.

COMPUTER SYSTEMS IMPROVEMENTS

Several major system upgrades and the installation of new hardware were accomplished. This period also witnessed the beginning of the implementation of two TRAC-FLVN data networks, one in a classified net-support DEC VAX-based minicomputer for computations and gaming and the other supports the transfer of unclassified information between office automation and desk-top microcomputer systems. Significant system improvements were made to the Central Computer Facility (CCF): a new VAX 8600 CPT was installed with 20 mega-bytes (Mb) of main memory and a disk clustering system which enables the sharing of mass storage with an exisiting VAX 780 CPU; the addition of 1.6 giga-bytes (Gb) of disk mass storage to an existing 1.2 Gb capacity; installation of an ethernet-based local area network throughout the CCF which interconnects it to the Training Development Computer Faciltiy (TDCF) and terminals located in the Telecommunications Facility (TCF). A new MicroVAX II CPU, with a 9 Mb main

memory, was installed in the CCF and connected to the ethernet.
Training Development Computer Facility (TDCF). Two MicroVAX II CPTs, (Mb main memory), supporting six interactive graphic workstations were installed to support the development of the Combat Battle Simulation (CBS) trainer. A third MicroVAX II was installed to support CORBAN model-based gaming. These systems were installed on a high-speed LAN that is interconnected to the CCF.

Wargaming Computer Facility (WCF). A DEC VAX 725 CPU system was relocated to the WCF to support wargaming model maintenance activities.

Combat Development Computer Facility (CDCF). The construction of a tempest-shielded room to support classified analytical computations was completed in Building 193. A MicroVAX II CPU (9-Mb memory) was installed in the CDCF along with a Wyse PC to support CD analysis mission activities.

Combat Simulation Training Facility (CSTF). A multiple DEC MicroVAX II CPU with interactive IEV-60 graphics-based workstation system was installed in the newly established CSTF located in Building 275. The 10 workstation system was interconnected with an ethernet LAN capable of supporting up to a 10-Mb-per-second data transmission rate to support the development and testing of the COMBAT-SIM training simulation model.

Office Automation and Secure Networks. Several electronic networks were implemented or expanded by TRAC-FLVN. These include:

- Electronic Networking of Major Analytical Agencies (ENMAA). The ENMAA project is intended to provide voice communicatons via secure telephone, secure facsimile, secure computer-to-computer bulk data transfer, interactive graphics and secure video teleconferencing between TRAC-FLVN, TRAC-WSMR, CAA, and AMSAA. Only two capabilities have been received: secure voice and facsimile.

- TRAC-FLVN Classified Local Area Network (CLAN). The TRAC-FLVN CLAN provides secure, integrated local/remote login and file access capability between TRAC-FLVN Digital Equipment Corporation VAX minicomputers on Fort Leavenworth. Currently, this capability links VAX minicomputers in buildings 50 and 52.

- TRAC-FLVN Office Automation Local Area Network. The TRAC-FLVN OA LAN has been expanded, from two Intel 310 multiuser XENIX-based systems, seven Wyse PCs and several WANG, NCR, and Centrex standalone word processors, by adding six Intel 310 systems. This network provides a total of 60 work stations, 16 letter quality printers, and 16 draft quality printers supporting over 110 analytical, administrative, and secretarial users. Since the Intel 310 computers are general purpose, they are used for word processing, spread sheet style calculations, database storage retrieval, direct programming using computer languages, and local electronic mail. All eight Intel computers are connected electronically, either through high-speed Ethernet LAN hardware for those computers located in the same building or through low-speed direct connect modems between buildings. The interconnection of these computers provides selected local/remote login, file sharing, and electronic mail capabilities throughout TRAC-FLVN.

SYSTEM SOFTWARE

Major system support software acquistions were completed. The following packages were added:

ADA - CCF VAX 8600

INGRESS (relational database management) - CCF VAX 8600, WGF VAX 785 and MicroVAX II, and MicroVAX II

SPM (System Performance Monitor) - CCF VAX 8600 and 780

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